

Application Serial No. 10/754,914  
Amendment dated October 21, 2005  
Reply to Office Action of July 21, 2005

### REMARKS

Claims 1-24 are pending in this application. The Office Action, dated July 21, 2005, rejected claims 1-24.

#### Claim Rejections – 35 USC § 112

Claim 7 has been rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. In particular, the office section requests a clarification and states that it is not understood how the melodic generator receives harmonic sequence data and that it is not understood how the structure of claim 7 can generate the melody based on both the DNA or harmonic data.

To assist the examiner in understanding the claim in view of music theory, a brief example using twelve bar blues is given. Twelve bar blues songs (in addition to comprising twelve measures) typically comprise a harmony based upon the tonic, subdominant, and dominant (the I, IV, and V chords, respectively) chords. In simple twelve bar blues songs, a single chord is used for an entire measure.

Within the measure, the melody uses notes using a scale (usually diatonic) that contains the chord tones of the chord given for the measure. For example, in the key of F, the tonic (I) chord comprises the notes F, A, and C which represent the intervals of a root, a major 3<sup>rd</sup>, and a perfect 5<sup>th</sup>. (The chord may comprise other tones of such as a dominant 7<sup>th</sup>, a flat ninth, sharp

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thirteenth, and the like.) In addition, a blues scale will typically comprise the tones a minor 3<sup>rd</sup> and dominant 7<sup>th</sup>.

Accordingly, a melody (having some degree of "musicality") for the given measure will typically comprise at least one note for the chord (e.g., F, A, C, and the like) and passing tones that are related to the chord tones, that approach and lead away from tone chords in a melodic sequence. A melodic sequence that is not based upon these harmonic rule sounds less musical and probably unnatural as well. For example, Dunn, in the last paragraph (see below for citation), states that just because all of the notes are there (that is, there is a DNA sequence available) who, it doesn't guarantee that it will result in something that will be worth using (by a human composer).

In the example program of the specification page 16, line 1, a comment is given showing that the melody can be assigned based on nucleotides (e.g., a DNA sequence) and chord tones. The chord tones are selected as in the code at the bottom of page fourteen and following to produce a harmonic signal "ct[1..3]", where the harmonic signal (see the Case statement(s) that use the nucleotide C, A, T or G and "ct" on page 16) is used (along with other information) to create a melodic signal "note[1..3]."

Four notes of each chord (harmony) are accompanied and followed by notes (melody) as shown in the "track" commands starting on page 16. The track commands show that the chord and a melody note are formed on beat one, a second melody note is formed on beat two and a third melody note is formed on beat three. The block of code is repeated to form subsequent

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measures with harmony and melody, both in response to subsequent nucleotide and amino acid information.

Thus, both how the melodic generator receives harmonic sequence data and how the structure of claim 7 can generate the melody based on both the DNA or harmonic data is supported by the specification. Accordingly, the claim is submitted to be allowable and not indefinite.

**Claim Rejections – 35 USC § 103**

Claims 1-24 are rejected under 35 USC 103 (a) as being obvious over Dunn's "Inflections: Music from DNA (1992-1995)" in view of Long (GB 2,350,469 A). Regarding claims 1, 8, 14-19, and 23, Dunn in view of Long fails to teach or fairly suggest a harmonic sequence generator that is configured to receive the DNA sequence, determine an amino acid that is defined by a three-segment DNA sequence, and determine a chord in response to the defined amino acid whereby a harmonic sequence is generated in response to a succession of defined amino acids.

The Office Action states that while Dunn's written disclosure is silent to distinguishing between melodic and harmonic generation, it is clear, that by listening to Dunn's (and Bridge's) compositions (available on the internet), that both harmony and melody are "transcribed" from the DNA sequences. Dunn's compositions are polyphonic (containing three voices) wherein each voice plays a note that is determined by a single amino acid. It is significant that the instrumentation (i.e., which instruments are chosen) and rhythm have been determined by a human composer (apparently Bridges in this case) because the duration of the notes (and the

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change of the spectral content over time) of a note played by an instrument determines any perceived harmony with respect to other voices. Thus, the perceived harmony results from notes overlapping each other, with the overlap being chosen by a human composer.

Bridges states that it is difficult to achieve this result: this doesn't mean that it has been easy to get to this point. There are dozens of instrument choices for each group. Since the instruments must work together, there are lots of permutations that must be tested [by the human composer] (page 2, paragraph 5). Accordingly, the resulting perceived harmony results by a composer trying different combinations to see what sounds good and not in response to determined amino acids. Thus, the statement that both harmony and melody are "transcribed" from the DNA sequences is traversed.

The Office Action states that Long clearly discloses the use of sounding both chords and arpeggios in accordance with amino acids. The examiner maintains that both chords and arpeggios create "harmony." The Action further states that one of ordinary skill would find it obvious to combine the teachings of Dunn and Long to obtain a DNA-to-music system having both melody and harmony generation. The Action states that the motivation to make this combination is that Western music has employed harmony and melody to achieve desired emotional expression for hundreds of years.

Applicants traverse these assertions because Long instead teaches producing sounds based upon physical location and structure of amino acids in proteins and does not teach doing so in response to amino acids determined from a received DNA sequence. This distinction is significant because (among other things) the received DNA sequence is used simultaneously to

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produce both a melodic sequence and a harmonic sequence (regardless of any protein morphology). Accordingly, neither Dunn nor Long teaches the claimed melodic sequence generator and the claimed harmonic sequence generator.

Furthermore Applicants believe the rejections to be based upon impermissible hindsight general motivation reasoning and that the proposed modification is not addressed towards claim differences. The motivation is too general because achieving emotional expression by employing harmony and melody in Western music for hundreds of years would contemplate almost any alteration of Dunn for achieving emotional expression and does not address why using a harmonic sequence generator would be obvious. As noted above, neither Dunn nor Long teaches the claimed melodic sequence generator and the claimed harmonic sequence generator. Additionally, although Long teaches producing sounds based upon physical location and structure of amino acids in proteins, there is no suggestion, other than in the Applicants' disclosure to produce both melody and harmony from a DNA sequence.

Dependent claims are submitted to be allowable for at least the reasons by which the claims they depend from are allowable. Accordingly, all claims are submitted to be allowable.

In view of the above amendments and remarks, Applicant respectfully requests a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Respectfully submitted,

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